

VHE gamma-rays from the blazar S4 0954+65 by the MAGIC Telescopes during an exceptionally high optical state

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The blazar S4 0954+65 (at a disputed redshift of $z=0.368$ or $z \geq 0.45$) underwent an exceptionally high state in optical during January and February 2015, as revealed by the Tuorla and St. Petersburg University blazar monitoring programs: a brightening of more than 3 magnitudes in the R-band from the average monitored states. Simultaneous data from the Fermi/LAT satellite at high energy gamma rays ($100 \text{ MeV} < E < 100 \text{ GeV}$) also show a period of increased activity.

MAGIC observations, triggered by the enhanced emission state at lower energies, led to the discovery of very high energy (VHE, $E > 100 \text{ GeV}$) emission from S4 0954+65 (ATel #7080). The VHE flux above 150 GeV is estimated to be about 6% of the Crab nebula flux above the same threshold.

In this contribution we present a comprehensive multiwavelength picture of this object, including data from mm/optical/X-ray/HE and VHE gamma-ray bands along with an analysis of the parsec-scale jet behavior. The study of the optical polarization degree and of the rotation of the polarization angle yields information about the magnetic field topology in the acceleration and emission region. The high emission state during the flare allows us to compile the simultaneous broadband spectral energy distribution and to characterize it in the scope of blazar jet emission models. With an unbiased and uniform scan of the multi-dimensional space of model parameters and an a posteriori evaluation of the model-to-data agreement, the applicability of current emission models, e.g. the synchrotron self-Compton scenario, can be tested. The agreement of the broadband spectrum with an emission mechanism commonly invoked for flat spectrum radio quasars (i.e. inverse Compton scattering on an external soft photon field from the dust torus) will be also discussed.

Summary

In Jan and Feb 2015 The blazar S4 0954+65 underwent an exceptionally high state in optical a brightening of more than 3 magnitudes in the R-band from the average monitored states.

MAGIC observations, triggered by the enhanced emission state at lower energies, led to the discovery of very high energy (VHE, $E > 100 \text{ GeV}$) emission from S4 0954+65 (ATel #7080).

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